



FY2001 Program

**U.S. Army Research Institute
for the Behavioral and Social Sciences**

October 2000

ARI Program 2001

The ARI FY2001 Work Program is the initial product of an extensive review of the needs of Army sponsors and of ARI mission and capabilities. A variety of efforts contributed to this, both conceptually and operationally. The Army's Transformation Campaign Plan was a major stimulus for this process. And, in March 2000 we published the results of a stakeholder analysis, one objective of which was to derive insights from our stakeholders to help ARI craft a proactive, long-term operational strategy. This, in turn, fed into the ARI Transformation Plan and the ARI Strategic Plan, which are now being finalized in order to provide focus and direction for our future program.

The present program, as the initial result of these analyses, represents a new integration of the needs of our R&D "customers" with our present and projected capability. Not surprisingly, the emphasis is on selection, training, and sustainment for a force which is at once digitized but also decentralized – where small unit operations in unconventional settings may be called for on a more regular basis – and where creative and flexible leadership at all levels will be paramount. There is an increased attention to the follow-through process for research – seeing to it that the products of R&D are not only delivered in a timely manner to those most in need of them, but that their utilization is informed by the same concepts and priorities that went into the formation of the research program.

Our program is diverse in that it represents a wide spectrum from basic research and applied R&D to efforts that emphasize immediate application of findings such as studies, analyses, surveys, and special projects. A long history of successful R&D efforts, and close contact with sponsors and proponents, feed into all of these programs and insure that ARI will continue to play a vital role in preparing the Army to meet the personnel and training challenges of digitization and the Objective Force.



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Introduction

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is the Army's lead laboratory conducting research, development, and analysis on training, leader development and soldier (TLS) issues. ARI's focus is on the human element in the Army, with research, development, and analysis contributing to the entire soldier life cycle of recruiting, selection, assignment, training, retention, and mission performance. ARI:

- provides new technology to meet the TLS challenges of the Army;
- conducts studies and analyses to address short-term issues and respond to emerging “hot topics”; and
- provides technical assistance on critical issues affecting all parts of the Army – the organization, the people, and the technologies for the future.

ARI's program supports three of the Army's Imperatives: Quality People, Leader Development, and Training.

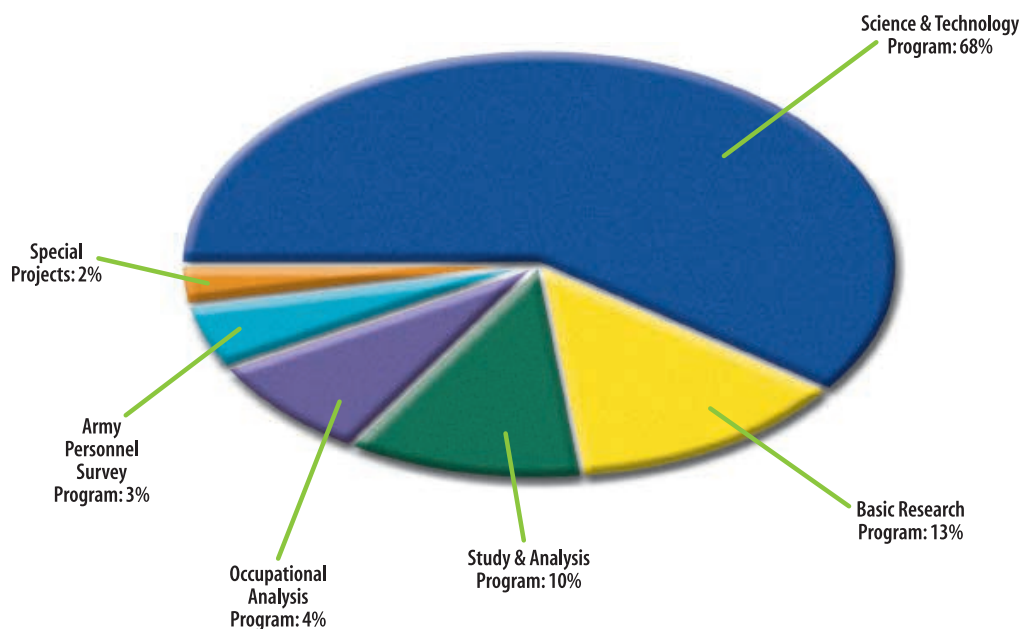
ARI Program Components

ARI's approved *training, leader development, and soldier* program consists of:

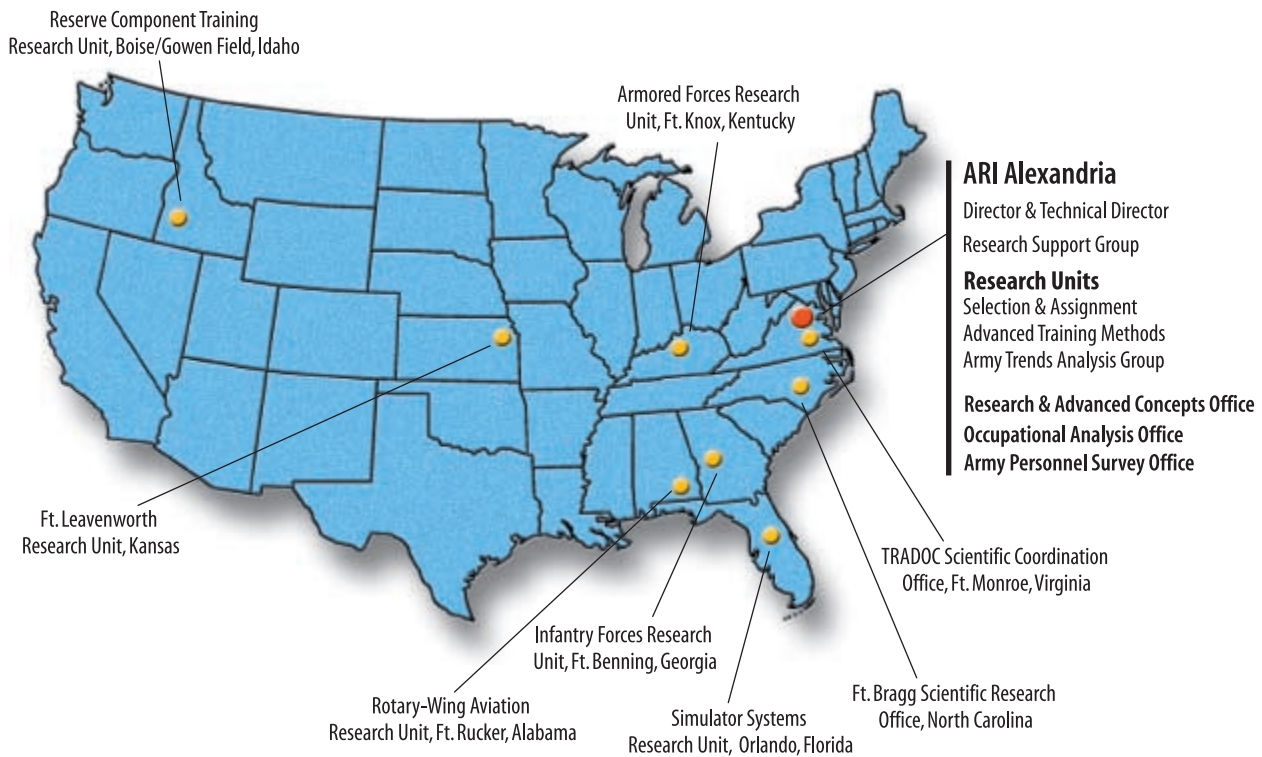
- **Science and Technology (S&T) Program:** Research and Development efforts addressing mid-term (3-6 year) Army needs.
- **Study and Analysis Program:** Short-term projects responsive to annual requests for information on specific personnel and training issues.
- **Special Projects:** One-time efforts performed in response to “hot topics” identified by senior Army leaders.
- **Basic Research Program:** Basic research dealing with scientific questions of interest to the Army.
- **Occupational Analysis Program:** Application of known principles and analytical techniques to the improvement of Army job structures.
- **Army Personnel Survey Program:** Application of data collection technology to the measurement of attitudes and opinions.

FY2001 Budget Allocation

The chart below shows the percentages of the total FY2001 ARI budget devoted to each of its program components.



Organizational Structure



The map shows ARI's locations in Alexandria, Virginia and at Army installations. S&T programs are executed through ten Research Units and Offices. In addition, the Research and Advanced Concepts Office (RACO) manages our Basic Research Program that focuses on issues of the future, primarily through university-based efforts. ARI also has two offices that provide operational support to the Army and one that provides coordination and liaison. Operational efforts are provided by: (1) the Army Personnel Survey Office (APSO) that develops and fields Army-wide surveys and provides expertise on personnel survey development and methodology to other Army and DoD agencies; and (2) the Occupational Analysis Office (OAO) that develops analytical tools and methods and conducts complex Army-wide occupational/job surveys and analyses. Coordination and liaison with TRADOC is provided by a Scientific Coordination Office located at its headquarters.

SCIENCE & TECHNOLOGY PROGRAM



Training

ARI's Training S&T Program includes nine work packages that develop innovative technologies and strategies for training the digital soldier, preparing units for 21st century missions, maximizing simulation-based training, and capitalizing on distance learning. The goal is to transform Army training to better prepare soldiers and units to win on future battlefields.

Leader Development

Our Leader Development S&T Program focuses on methods to support decision-making and quick thinking on the battlefield, provide fast-track development of Army leaders, and develop the digital command staff. The goal is to leverage cognitive and instructional technology in ways that improve critical thinking skills and the adaptability needed by future leaders.

Soldier

ARI's Soldier S&T Program includes five work packages that develop new technologies to recruit, assign, and sustain quality personnel. The goal is to maintain and enhance the quality of the Army through research on managing attrition and retention, improving selection, assignment, and promotion procedures, and understanding soldier concerns.



Virtual Environment Research for Infantry Training & Simulation

Simulator Systems
Research Unit

Photo: Sarah Underhill, Soldier Systems Center (Watrick).



Members of small dismounted infantry units will face growing responsibilities and increasing challenges in combined arms combat and in contingency operations on the digitized battlefield of the future Objective Force. Training for night operations, Military Operations in Urban Terrain (MOUT), and other diverse missions is limited by time, cost, and safety factors. Virtual Environment (VE) technologies have the potential to provide the Army with a training capability to meet these new demands.

This effort (FY1999-2002) will provide the Army with:

- Prototype, VE-based, dismounted-soldier simulation system with instructional features that enhance the effectiveness of training and mission rehearsal.
- Effective training methods, strategies and procedures for using VE technology to train and prepare dismounted small unit leaders to conduct night, MOUT, and contingency operations.

Results from experimental evaluations at the Dismounted Battlespace Battle Lab (DBBL) will facilitate the development of requirements for dismounted training simulators and future infantry simulations. This work will be carried out in conjunction with the U.S. Army Simulation, Training, and Instrumentation Command (STRICOM), and will have immediate application to their simulation products. We have already developed and evaluated initial VE-based small unit leader training vignettes and implemented an immersive testbed for small unit training.

In FY2001 we will:

- Implement a prototype system for computer recognition of human gestures.
- Assess the effectiveness of dismounted leader After Action Review System.
- Evaluate the use of VE for night operations training.



*Dismounted
Soldier
Simulation*

Simulation-Based Aviator Training



Army flight training is evolving toward greater reliance upon simulators as downsizing and reduced resources provide fewer aircraft hours and instructors. These factors, along with the accelerating pace of simulation technology, have impelled the Army to develop simulation as the primary means of skill learning to attain basic and advanced aircraft qualification.

This effort (FY1999-2003) will provide the Army with training objectives, methods, and

instructional strategies that illustrate how simulation can best support Army flight training, from initial to advanced aircraft qualification. In cooperation with the Army Aviation Center, we have begun developing prototype training programs that use simulators together with aircraft in combinations intended to exploit the best training capabilities of both environments. In addition, using our in-house simulator research facilities, we investigate the role of simulation devices ranging from desktop training devices to flight simulators, and the role of instructors in the initial and advanced flight training programs. We continue to identify the role of simulation devices, instructors, and instructional processes in simulator training for Initial Entry Rotary Wing (IERW) flight training, and are now evaluating prototype helicopter instrument flight training in the TH-67. We work cooperatively with the Army Aviation Center and School to define the nature of the revised flight training curriculum called Flight School XXI.



In FY2001 we will:

- Continue transfer of training research on simulator-based TH-67 training for the instrument phase of IERW flight training.
- Extend the Intelligent Flight Trainer automated verbal coaching concept for hover, approach, and landing pattern tasks in primary flight training.
- Evaluate the effectiveness of video game-based flight simulator systems in initial aircraft qualification for Army helicopter pilots.

**Flight
Qualification
with Simulation**

Maximizing Resource Efficiency of Reserve Component (RC) Weapons Qualification

Reserve Component
Training Research Unit



Photo: Sarah Underhill, Soldier Systems Center (Natick).

Live-Fire Proficiency

In today's do-more-with-less resource environment, the Army is relying more and more on its RC to meet military commitments at home and abroad. Without an associated increase in training time and other resources to help meet this challenge, the RC must learn to train and evaluate itself more efficiently than it does now.

To this end, the objective of this task (FY1999-2001) is to develop innovative training and evaluation strategies and tools for maximizing the resource (e.g., time, ammunition, OPTEMPO costs) efficiency of RC weapons qualification. In FY1999, we developed a tank gunnery engagement strategy that reduces crew-level proficiency assessment resources by 20%.

The U.S. Army Reserve Command plans to use our rifle and pistol research products to reduce the time and ammunition required for live-fire small-arms qualification while the National Guard Bureau is looking to use our tank gunnery strategy to maximize the payoff from resources spent on tank gunnery evaluation.

In FY2001, we will complete development of USAR tools for predicting live-fire rifle and pistol marksmanship proficiency from training device scores. This will provide a device-based alternative to live-fire qualification when range facilities are unavailable.



Assessment of Training Tools and Techniques for Force XXI

The transformation of the Army will require training that is increasingly simulation-based. Units will need tools and techniques for developing, assessing, and tailoring training packages to prepare for a variety of operations using mixes of equipment, real and simulated.

This effort (FY1999-2001) will provide the Army with prototype tools and techniques for developing, delivering, tailoring, assessing, and refining simulation-based training to meet dynamic 21st Century requirements, with a focus on the mounted force. We will provide such products as the ARI-developed Commanders' Integrated Training Tool (CITT) for use with the Close Combat Tactical Trainer (CCTT) as part of an integrated package of training tools and techniques for unit commanders and other unit trainers. We have produced prototype training support packages (TSPs) for platoon and company teams (armor/infantry mix) on future digital operations in the CCTT. Also, the second generation CITT has been completed and is being evaluated for fielding with the CCTT.



Unit Training Development

In FY2001 we will:

- Complete prototype tools and techniques for tailoring training packages to prepare units for a variety of operations and configurations, using mixes of equipment and capabilities.
- Demonstrate new training and performance assessment technologies that prepare commanders and unit leaders to take advantage of emerging simulations.

Embedded Collective Training for Future Brigade Combat Team Commanders and Staffs

Armored Forces
Research Unit



Development of a Future Combat System (FCS) for a maneuver force that is medium weight, quickly deployable, extremely reliant on information networking capabilities with flexible, adaptable soldiers and leaders, engenders a parallel training development challenge. The vision that the FCS will include an integrated embedded training capability for individual platform task training as well as for commander/staff training highlights a critical sub-system requirement. Advanced training technologies and methods effectively meeting this requirement must be designed, developed, demonstrated and evaluated in lockstep with the development of the FCS.

This effort (FY2001-2007) will conduct research to identify and address key training issues for future Brigade Combat Team (FCS equipped) commanders and staffs with emphasis on C4ISR (Command, Control, Communications, & Computers, Intelligence, Surveillance, and Reconnaissance) capabilities. We will define an overarching framework for integrated embedded training systems for the maneuver force of 2012 that specifies key functional areas such as methods, measurement, management, and feedback for unit and C4ISR training. We will describe the research requirements for each functional area through a series of concept papers. Using this systems framework, we will design and conduct a sequence of simulation-based experiments to address research requirements within selected functional areas with emphasis on the collective C4ISR requirements. The experiments will maximize the use of simulation-based techniques and tools to develop and then demonstrate prototype embedded Training Support Packages (TSPs) in selected Advanced Technology Demonstrations (ATD). In addition, the results will provide empirically derived input to the FCS Training Device Requirements/Training Device Needs Statement (TDR/TDNS) processes.

In FY2001 we will:

- Define the research framework and specify research objectives for four selected functional areas.
- Observe one or more Initial Brigade Combat Teams and identify potential training issues relevant to FCS.

**Embedded
Collective Training
Techniques**



Defining and Measuring Digital Skill Proficiency

The Army must be capable of assessing the growth in skills and proficiency acquired by soldiers, staff, commanders, and units as they train on Army digital C4I systems. In addition to measuring operator skills, trainers must be concerned with measuring “user” skills and a unit’s compliance with its own digital standard operating procedures (SOPs).



This effort (FY2001-2005) will provide the Army with:

- Validated measures of performance (MOPs) for digitization-sensitive collective tasks, digital tactics, techniques and procedures (TTP) applications, task-based digital skills, unit digital SOP compliance, and digital proficiency levels
- Guidance for applying MOPs, including tool requirements to support the application of MOPs

The development of digital MOPs and guidance for their use will focus trainer workload, reducing observation requirements by nearly half. These products will also allow more time for mentoring and coaching, resulting in improved training outcomes. Ultimately, this effort will contribute to efficient performance of future command, control and communications training systems that will evolve within the Future Combat System.

In FY2001 we will:

- Describe changes in unit behavior associated with digitization.
- Provide a database linking mission tasks, task-based digital skills, unit SOPs, and MOPs.

*Preparing for
Digitization*

Training Modernization: Preparing Leaders and Soldiers for the Modern Battlefield

Infantry Forces
Research Unit

As the Army progresses from the Army of Excellence to the Objective Force, leaders and soldiers will be provided with numerous new high-tech systems and operational concepts. Small unit leaders must be prepared to make mission critical decisions based on increasing amounts of digital information. Full spectrum operations will become the rule. Emerging technologies are being built to address many of the future requirements. The full benefit of new information and weapons systems will only be realized if the new training challenges are understood and resolved.

This effort (FY1999-2002) will provide the Army with training methods that enhance situation awareness, and the processing and integration of battlefield information in the context of emerging high-tech systems. The research will largely be conducted in conjunction with planned systems tests and Army experiments, with a primary focus on new Infantry systems. Research supporting the Military Operations in Urban Terrain (MOUT) Advanced Concept Technology Demonstration (ACTD) has developed a training impact analysis methodology to enhance rapid acquisition selection decisions of MOUT technologies. Research results will also guide the design of computer skills training programs needed for new digital systems such as the Land Warrior and new Battle Command Brigade and Below systems. Other research will develop alternative means for measuring small unit situation awareness.

In FY2001 we will:

- Complete three-year trend analysis on soldier and leader computer background skills
- Conduct field test of situation awareness measurement instruments for small unit leaders.

*Enhancing
Situation
Awareness*



Training Tools for Web-based Collaborative Environments



Training in the Army is shifting from a system that is classroom-based to one that is soldier- and network centered. The purpose of this shift is to deliver instruction on demand wherever and whenever needed. Research on how best to use distributed delivery systems to train will help the Army take best advantage of emerging technologies.

This effort (FY1999-2003) will demonstrate that well-designed use of Internet and Web-based technologies, particularly for collaborative training or learning, can be at least 20% more effective than traditional classroom methods. In addition, numerous instructor functions in synchronous and asynchronous learning environments can be automated, leading to reduced training costs.

By its completion, ARI will provide the Army with strategies and “how to” guidelines for developing and implementing a soldier-centered, training-on-demand paradigm that uses training delivery technology from the commercial marketplace. Research on increased levels of task complexity will help to determine viability of delivery mechanisms such as the Internet. The goal is to provide collaborative learning environments for tasks such as selecting target priorities in a rapidly evolving battlespace. We have already tested distributed training of complex cognitive skills using the virtual sandtable. Use of the virtual sandtable, compared to the conventional, resulted in a 50% improvement in training efficiency with equivalent performance.

In FY2001, we will test Internet delivery of collaborative learning (synchronous and asynchronous) vs. platform instruction for advanced-level officer career courses in three Army branches (Armor, Engineer, and Military Intelligence).

*Exploiting
Distributed
Learning*

Principles and Methods for Training Digital Skills

Advanced Training
Methods Research Unit



The Army is greatly increasing its use of digital weapons, equipment, and technologies that demand soldiers and commanders with information-age skills. There is a need to identify how best to train and sustain the skills required for digitized operations and procedures.

This effort (FY1999-2003) has produced a comprehensive ARI-wide plan of training research needed to help the Army maximize the benefits of “going digital.” The plan addresses critical research about training soldiers to: (1) adapt to frequent system changes and upgrades, (2) cope with extensive quantities of data and ambiguous information, (3) operate as components in network-centric environments, and (4) integrate training of digital systems with Army tactics, techniques, and procedures.

Based on the plan, one specific research area will test principles and methods for individual soldiers to maximize the acquisition, transfer, generalization, and retention of skills as operators and staff in digital environments. By completion of the research, ARI will provide the Army with general principles of training and knowledge transfer that improve digital skill acquisition and sustainment. We have already investigated alternative ways to train soldiers in the effective use of digital systems, comparing standard platform training with discovery/exploratory methods. The latter enhance a soldier’s ability to apply skills to novel situations.

In FY2001, we will provide:

- Research findings on the training, transfer, and adaptability of digital skills as a function of training method.
- Guidelines on assessing digital skill decay that improves prediction of which tasks need the most sustainment training, resulting in a 20% saving in training load.

**Mastering
Computer-Based
Jobs**



Fort Leavenworth
Research Unit

Developing Commanders for Future Battlefields

Traditional officer development has focused on the acquisition of knowledge. To face future challenges and solve military problems effectively, Army leaders will need to improve their versatile thinking skills, critical reasoning, creativity, adaptability to change, and their ability to inspire, develop, and organize others to be more effective themselves.

In this effort (FY1998-2002), we have developed a model of versatile thinking skills for future battle command, and validated measures of leaders' tacit knowledge (critical knowledge gathered through experience). Also, we have documented staff officers' cognitive skills training and development requirements. We will explore several alternative approaches to structured self-development of complex thinking skills. By its conclusion, ARI will have provided the Army with self-paced instruction in complex thinking skills that supplements and extends standard command and staff development programs. The instruction will reflect changes in missions, tasks, tools, and organizational structures projected for future forces. This supplemental training will be provided for inclusion with officer development activities at the U.S. Military Academy, Cadet Command, TRADOC-DCST-ITD, and the Command and General Staff College.

We have already:

- Developed a model for describing the relationship between critical thinking skills, knowledge, attitudes, battle command tasks, and battle command performance.
- Developed, demonstrated and evaluated instructional modules for versatile thinking in command (focusing on brigade command functions and tasks).
- Developed methods to measure effectiveness of versatile thinking skills training.

In FY2001 we will:

- Analyze the sequence of interactions between an expert mentor and Brigade Commanders in a series of 12 vignettes designed to encourage adaptive thinking.
- Develop methods to teach self-regulation of conceptual thinking.



Photo: Sarah Underhill, Soldier Systems Center (Warick).

**Versatile Thinking
Skills**

21st Century NCO Requirements

Selection & Assignment
Research Unit

The battlefield of the future will require Non-commissioned Officers (NCOs) who can train forces and operate effectively in digital environments with increased mission diversity, fewer soldiers, and organizational and social changes. The NCO promotion system for the 21st century will need new NCO selection and measurement procedures to evaluate the full scope of performance needed to successfully meet future job requirements.

This effort (FY1998-2002) has identified future NCO job demands and future NCO personal characteristics for the period 2000-2025, developed new measures of skills, knowledge, and attributes, and developed new NCO performance measures. By its conclusion we will provide the Army with:

- Better predictors of future NCO performance.
- A basis for linking NCO promotion decisions to measures of performance and potential.



Photo: Sarah Underhill, Soldier Systems Center (Natick).

**Performance-
Based Promotion**



Photo: Sarah Underhill, Soldier Systems Center (Natick).

The Deputy Chief of Staff for Personnel, U.S. Total Army Personnel Command, Sergeant Major of the Army, U.S. Army Sergeants Major Academy, and U.S. Army Training and Doctrine Command (TRADOC) will use these products as a basis for developing improved NCO promotion procedures, and to guide future NCO training and development.

In FY2001, we will begin to link predictor knowledge, skill and attribute measures to new performance measures by administering them to samples of NCOs.

Improving Personnel Development for Small Unit Operations

Doctrine and mission requirements of the 21st century Army will emphasize small, highly trained semi-autonomous units. A model for this are today's Special Forces (SF). The recruiting, selection, training, and assessment of SF personnel must ensure adequate soldier flow through the development and assessment process to high performing units. Transfer of methods and strategies that facilitate this process to other Army units will provide improved capability to develop forces for diverse and rapidly changing missions.

This effort (FY1997-2001) has identified organizational processes, structures, policies, and concerns that need to be addressed to optimize morale and effectiveness of SF teams. ARI has identified specific individual, team, and organizational practices that inhibit or facilitate effective SF team performance. In addition, we have identified integrity measures and adaptability assessments as products for transfer to the conventional Army.

By FY2001 we will provide the Army with:

- Methods and strategies for SF leaders to use to diagnose problems, design solutions, and implement and evaluate individual, team, and organizational level interventions.
- Strategies for use in systematic assessment of future Army organizations, where small, highly trained, semi-autonomous units are expected to play a large part.

In FY2001 we will begin to transfer SF methods and products to conventional Army sites.

*Special Forces
as a Testbed*

Photo: Sarah Underhill, Soldier Systems Center (Norc).



Soldier Attitudes and Opinions

Army Trends Analysis
Group



Photo: Sarah Underhill, Soldier Systems Center (Natick).

Command Climate

Senior leaders have a continuing need to accurately assess the command climate of the Army and to identify the issues that concern soldiers. This research on soldier attitudes and opinions provides input for Army policies and for program decision-making.

This FY1998-2003 effort has developed a methodology for assessing soldier attitudes and opinions and conducting assessments of command climate. ARI will continue to provide data on soldier attitudes and opinions and develop improved methods for assessing them. This will allow the DA DCSPER and other senior leaders to gain insights into soldier concerns, track trends, identify emerging issues, and provide solutions to Army problems.

In FY2001 we will:

- Refine methods to assess the Army command climate.
- Identify recurring and new issues of concern to soldiers.

Attrition Determinants and Management

Lately, over one-third of the soldiers attrit the Army before having completed the first term of enlistment. High attrition rates impose burdens on recruitment, increase training costs, and reduce the personnel stability needed for unit preparedness. The Army needs a solid understanding of the causes of attrition and of ways of reducing it.

This effort (FY2000-2003) will add to existing data on attrition during Initial Entry Training (IET) to determine the personnel, organizational, and extra-organizational factors that account for attrition across the first enlistment term. By project conclusion, these data will be used to construct a model of first-term enlisted attrition. Strategies for effectively managing attrition during key phases in the enlistment period will be identified and assessed. The Office of the Assistant Secretary of the Army (Manpower and Reserve Affairs) and the DA DCSPER will use these products for initiatives to reduce attrition and build the career force.

We have already analyzed data on the FY1992 cohort of enlisted soldiers to provide initial indications of reasons for attrition. Researchers have also identified factors influencing the propensity of IET graduates for service completion.

In FY2001 this project will:

- Identify the Army job and organizational factors influencing propensity for first tour service completion.



Photo: Sarah Underhill, Soldier Systems Center (Watrick)

First-Term Attrition

Improved Screening Tools for Recruiters and Station Commanders

Selection & Assignment
Research Unit

Since the inception of the All Volunteer Force, the Army has strived to fill its ranks with high quality youth. In recent years, recruiting has become more challenging, and the Army has had difficulty enlisting sufficient numbers of high quality individuals. To meet this challenge, new personnel tools are required to identify and select individuals and station commanders who can effectively sell the Army to future prospects.



This effort (FY2001-2003) will develop and validate personnel screens that can provide a ten percent gain in recruiter productivity and station commander performance. This project will provide comprehensive, selection-oriented job analyses of the recruiter and station commander positions. This information will inform the development of new and tailored personnel selection screens that will then be empirically linked to measures of job performance. The Deputy Chief of Staff for Personnel, the U.S. Army Recruiting Command, and the U.S. Total Army Personnel Command will use these products to identify individuals who will be highly productive recruiters and station commanders.

In FY2001, this project will:

- Complete selection-oriented job analyses of station commander and recruiter positions.
- Develop new screening tools for station commander and recruiters.

*Recruiter
Productivity*





STUDY & ANALYSIS PROGRAM

Commanders' Insights and Assessments on Managing Change in Digital Divisions



Photo: Sarah Underhill, Soldier Systems Center (Natick).

*Knowledge
Sharing for
Managing
Change*

The Army has selected the 4th Infantry Division to become the First Digital Division (FDD). Commanders in the Division and their respective staffs contribute to the success of this digital fielding process through their innovative ability to “manage change.” The commander and soldiers of the FDD are involved daily in managing and coping with change. There is a need to capture their organizational knowledge and personal insights, for these are key to the success of subsequent digital divisions as well as to the success of their individual position replacements.

ARI will determine the focal areas of concern that best describe the commander and key leader interactions and insights. We will design a relational database and elicit the commander and key leader insights in these focal areas. We will then codify that knowledge in an easily accessible and modifiable database. This study

will support commanders with tools and techniques for continual updating of the database toward the goal of fostering a learning organization in this and future digital divisions.

Sponsor: TRADOC (U.S. Army Armor Center – Directorate of Training and Doctrine Development) and Commanding General, 4th Infantry Division

Defense Language Institute Attrition

Advanced Training
Methods Research Unit



Army linguists require long and expensive training. Each student who does not complete the training and go on to become a linguist represents not only a burden on recruiting and a substantial training loss but also adds to the chronic shortage of linguists in the field. There is some attrition across the Army in all MOSs. Does DLI attrition mirror the level for comparable Army MOSs and linguists from the other Services; does it result from similar causes? Or is DLI attrition excessive and perhaps due to special factors that might be controlled or corrected?

Interventions to Reduce Attrition

Multiple actions will be undertaken to determine how to reduce Army linguist attrition. The first step will be to assess the level of DLI attrition for those in Army linguist training compared to those from the other Services and to those in selected other long-term, intensive Army training programs. The second step will be to analyze the causes of attrition using past research, records, focus groups, and a panel of DLI students followed over the length of the study. Potential causes that will be examined include trainee characteristics, instructional factors, the school environment, and variables external to the DLI training such as perceived civilian opportunities, Army career expectations, and contemporary culture. Third, a survey will be given to East and West Coast DLI graduates that covers their training, work situations, and career intentions. Fourth, an evaluation will be made of selection criteria for the linguist program. Finally, the findings from these activities will be presented to a representative group of relevant stakeholders who will participate in preparing recommendations for improving the selection, training, and management of linguists. The study product will be a proposed set of interventions designed to reduce DLI attrition. These interventions may concern selection, instruction, counseling, mentoring, supervision, or general management of the linguist program.

Sponsor: TRADOC (DCST-ITD)



Solutions to Computer Compromise (Cheating) in Web-Based Learning Environments

Plans are in place to move training from a classroom-centric delivery of instruction to a learner-centric model. Soldiers will receive training increasingly in the workplace, at their residences, or other sites outside the traditional classroom in a web-based training environment. Increased reliance on remote delivery systems accentuates the possibility of training compromise and cheating. Practical solutions based on recommended processes, procedures, and application of software changes need to be identified.

The Internet community faces a growing need to authenticate the identities of remote users. Similarly, as web-based learning emerges as a cost-effective option for training and testing of military skills and knowledge, precautions must be taken to ensure that training is not compromised. The study will sponsor a state-of-the-art workshop on the various options to solve the problem. One option includes biometric devices that create accurate digital records for verification of a person's physiological features such as an iris, a voice, a signature, a fingerprint, a hand or a face. Other options include biographical quizzes during testing, computer-adaptive testing to negate the use of crib sheets, and the use of commercial test centers. Leading experts from academia, the government, and industry will present positions on how these technologies can be employed by the Army. Based on this assessment, independent reviewers will recommend a course of action that considers cost and feasibility.

Verifying Web-Based Learning

Sponsor: TRADOC (ATSC-DLD)

Deployable Training Management and Support Templates

Armored Forces
Research Unit

Current processes and procedures are not adequate to provide training management and support for deployed Army forces given the present operational tempo and personnel turbulence associated with those deployments. Training support has too often been reactive, coming well after the time when it is required or not at all. It is challenging to make quick adjustments in training plans with limited training staffs typically available during deployments. Standard readily available training packages or templates are needed.

This study will begin with an analysis to determine the minimum training needs for deployed commanders, staffs, and units. This will be followed by identifying the training support currently available for deploying forces. We will then provide recommendations for the necessary policy and procedures to integrate training management and support. ARI will develop one notional training template to meet the needs of deployed and deploying forces. This template design will serve as an example of how future templates can be adaptable to specific training needs and linked to available training tools and information sources.

Sponsor: TRADOC (ADCST-W) and 7th Army Training Command (Director of Training)

**Adaptable
Training
Template Design**



Photo: Sarah Underhill, Soldier Systems Center (Natick).

Evaluation of the Officer Initial Entry Training (IET) Concept

As the TRADOC Transformation enhancements to the Army's Officer Education System unfold, a bold and innovative change will come to officer initial entry training. All new officers will participate in a common core Basic Combat Training Course, followed by branch-specific tactical and technical training. Through a spiral development process, this training will be continuously developed and refined. There is a need to document lessons learned throughout, and to evaluate the effectiveness of the training over time, to ensure that the optimal program is provided.

This study will capture lessons learned on the design and execution of the officer common core training in its pilot implementation in FY2001 and offer a plan for evaluation of the expanded program in the follow-on years. In this study phase, both current and proposed Officer Basic training courses will be evaluated, and surveys administered to gauge the effectiveness of the Programs of Instruction. Graduates will be surveyed at course completion and six months later. Receiving unit commanders will be asked to provide feedback on performance. At the end of FY2001, preliminary data will be provided to proponent schools, along with a plan for long-term assessment.

*Assisting
TRADOC
Transformation*

Sponsor: DCST

Evaluation of Training Entrance Requirements for Patriot Soldiers

Selection & Assignment
Research Unit



Prospective soldiers are recruited and classified using enlistment aptitude standards. When quality standards are set too high in an MOS, it is more difficult to fill training seats. To make mission, some of the better students will not be challenged, and other MOSs will be deprived of needed quality. When quality standards are set too low, training performance suffers and attrition becomes a problem. The importance of appropriate quality marks is especially important when recruiting is difficult. An analysis is needed of the impact of changing standards.

data collected over the last several years, and possibly Army Training Requirements & Resources System (ATRRS) data.

This study is focused on Patriot soldiers, in MOS 14E and 14T, and will quantify the trade-off between lowering standards and increasing training attrition. The study will rely on Air Defense Artillery (ADA) School

**Standards
for Selection**

Sponsor: PERSCOM (EPMD-ADA)



Adoption of New Army Aptitude Composites

The Army currently employs nine Aptitude Area (AA) composites in its MOS classification of new recruits; the composites are derived from the ten subtests in the pre-enlistment test battery (ASVAB), combined in a manner that makes them easy to calculate but not optimally efficient for MOS classification. The Office of the Secretary of Defense has requested that the Services eliminate the two speed (i.e., timed) tests in the battery. If this comes to pass, the classification efficiency of the existing Army composites will be further reduced and it will necessitate steps to redefine the existing composites. Instead the Army may adopt a new set of classification-efficient composites which have been developed by ARI based on a job performance criterion.

There are 17 new classification composites, which function as predictors of performance in the MOS which are within each of the 17 empirically defined job families. The placement of MOS in the respective families needs to be reviewed, qualifying scores on each composite need to be derived, and applicant pools need to be analyzed to determine how the new composites and cut scores affect enlistment eligibility. Pending successful outcomes, a final step in adoption of these composites would be informing MOS-training schools of the superiority of the new AA structure and the benefits that would be realized.

**Classification
and Eligibility
Determinants**

Sponsor: DA DCSPER (MPA)



Evaluation of the Buddy Team Assignment Program to Reduce Attrition

Selection & Assignment
Research Unit



The U.S. Army Infantry Center initiated the Buddy Team Assignment Program (BTAP) to reduce attrition risk in the first unit of assignment. In this program, soldiers are paired in training, and the paired soldiers are sent and stay together in a unit for at least a year. The idea is that attrition risks will be cut as the Buddy Team members serve as readily available sources of social support in adjusting to the units and Army life.

BTAP will be evaluated in this study. The evaluation will determine how recruit characteristics, and interactions between Buddy Team pair members, account for adjustment to units and to Army life. In addition to examining the adjustment of newly assigned soldiers, the study will also seek to understand how success of the BTAP relates to unit climate, unit policies/practices/norms regarding attrition, and the quality and extent of program implementation.

Sponsor: PERSOM (EPK-I)

***Attrition
Reduction
Benefit of
Buddy Teams***



Retention/Reenlistment Incentives Analysis

Retention and reenlistment incentives are provided through several programs such as special pay, special duty pay, and – most importantly – selective reenlistment bonuses (SRB) with an annual budget of \$90M in FY2001. The empirical relationships underlying the link between the SRB program and retention were last estimated in 1995. Recent developments suggest that there might have been a shift in soldier responsiveness to these bonuses. At the present time the Army is in need of methodologically sound and up-to-date methods for making efficient SRB allocations.

The study would seek to determine the impact of monetary incentives upon reenlistment behavior at aggregate and MOS levels. Study activities will include a review of the empirical literature, creation of an analysis data set based on fifteen years worth of enlisted master file records, utilization of historical and current program eligibility rules and incentive amounts, estimation of Annualized Cost of Leaving (ACOL) retention models at first, second, and third decision points, and development of a PC-based tool for efficient allocation of the bonus pool across MOS.

***Reenlistment
Responsiveness
to Incentives***

Sponsor: DA DCSPER (PRS)



Operational Impact of the Assessment of Individual Motivation (AIM)

Selection & Assignment
Research Unit

ARI recently developed a test of motivational attributes designed to predict enlisted attrition and job performance. This new measure is called the Assessment of Individual Motivation (AIM). Positive findings from ARI's AIM pre-implementation research program (1998-1999) have led to its operational use in an innovative Army recruiting-market expansion program, "GED Plus," whereby AIM scores may compensate for a lack of a high school diploma. This pilot program, which began February 2000, will continue through September 2003.

ARI is conducting this study for the Army's Office of the Deputy Chief of Staff for Personnel to support the ongoing use of AIM under the GED Plus Program. AIM's validity will be assessed using existing data as well as new operational data used for applicant screening under GED Plus. This effort will help the Army to evaluate AIM's utility as a market-expansion screening tool and prepare new AIM forms for operational use.

Sponsor: DA DCSPER (MPA)



***New Test to
Predict Attrition***

Photo: Sarah Underhill, Soldier Systems Center (Watrick).

The Army Continuing Education System: Its Role and Effect on Attrition, Reenlistment, and Training

The Army Continuing Education System's (ACES) mission is to promote lifelong learning opportunities to improve the capabilities of soldiers by providing and managing quality self-development programs and services. An assessment is needed to determine the impact of the ACES program on personnel retention and performance.

This study will assess the effect of ACES on retention and performance. The study will focus on several major ACES programs (e.g., Tuition Assistance) and evaluate the effects of participation in these programs on multiple outcomes of importance to the Army. These outcomes may include decision-making, creativity, and technological skills – which have been emphasized in the Vision Statement by the Chief of Staff and the Secretary of the Army as being important for the Army of the future. Other outcome measures will include attrition, reenlistment, and training performance.

It is anticipated that this study will be a basis upon which to make significant decisions to improve the management of enlisted recruiting and retention – and provide quantifiable, defensible formulations for the use of continuing education in support of training.

Sponsor: PERSCOM The Adjutant General Directorate, Education Division

*Impact of
Voluntary
Education*



Updating ARI Officer Longitudinal Research Data Base (OLRDB) & Educational Benefits Usage Data Base

Selection & Assignment
Research Unit

Data bases used at ARI to inform personnel policy decisions at ODCSPER and PERSCOM need to be updated on a regular basis to ensure timely and accurate analyses. The OLRDB is utilized by the Army Personnel Survey Office in its analysis and presentation of findings from the ongoing Survey on Officer Careers (SOC) program. The data base also supports ARI leadership research. Also, the provision of educational benefits is an important and expensive program designed to aid recruiting and to address larger social goals. Accordingly, program participation and benefit usage data are collected and analyzed by Army planners responsible for monitoring and projecting future financial obligations and for reporting to Congress. It is necessary to update these data bases with 1999 – 2000 data.



The OLRDB is a longitudinal file of Army officers that allows the analyst to easily track many aspects of Army officer career progression. At the present time this database includes all members of 1979 through 1998 year groups (both stayers and leavers). Updates are developed from the end-FY Officer Master and Separation Officer Master files maintained by PERSCOM. Information from the Survey on Officer Careers is regularly used by PERSCOM/OPMD, DCSPER/DMPM, USMA, Cadet Command, and to respond to OSD/Congressional inquiries.

The educational benefits usage data base is built from Army personnel, Defense Manpower Data Center, and Veterans Administration records. With this data base, Army College Fund and Montgomery GI Bill program participation and benefit usage rates, as well as elapsed time between separation and usage, and type of educational program entered can be tabulated by accession cohort (going back to 1981).

Sponsor: PERSCOM (OPMD) and DA DCSPER (MPA-RR)

**Track Officer
Personnel Issues**



Analysis of Personnel Factors Which Influence Unit Effectiveness

In this supply constrained recruiting environment, sound management of the available human capital is critical. Sound management requires decisions and understandings of the mission, training, leadership, and personnel (quantity and quality) factors that together determine individual soldier effectiveness and, ultimately, the effectiveness of the units of which they are members. Estimates of the tradeoffs among these factors are needed to support personnel management decisions.

While this effort cannot fully solve the overall problem raised by the study need, progress toward solution will be made through specification and clarification of the interactions of training, leadership, and soldier (TLS) factors and their relationships with unit performance. This will occur through review and assessment of past and ongoing efforts in the military and in civilian organizations, to include efforts intended to improve unit performance readiness through personnel interventions. Based on the obtained understandings, the study will set forth the research issues that need to be addressed and will recommend an approach for carrying out research for identifying and supporting estimates of the tradeoffs of TLS factors in personnel management decisions supporting unit effectiveness.



Photo: Sarah Underhill, Soldier Systems Center (Watrick)

*Predicting
Likelihood of
Success*

Sponsor: PERSCOM (DCSOPS)



BASIC RESEARCH





Identifying New and Promising Technologies

Research and Advanced
Concepts Office

The Research and Advanced Concepts Office (RACO) manages our basic research program, which focuses on personnel, leadership, and training issues of the future. Most of the research in the basic research program is conducted by universities. RACO maintains close contacts with ARI's applied researchers and other relevant agencies within the Army. These contacts provide two advantages. First, they help to better define issues that require fundamental research, and second, they facilitate the transition of basic research results to the applied program for eventual use by the operational Army.

A recent focus of the program is to develop a better understanding of those behaviors that contribute to effective leadership. We have recently determined that certain transformational behaviors by platoon leaders and sergeants contribute to effective platoon performance. A new research effort seeks to determine whether these effective behaviors can be trained. Research has also begun to determine the effects of electronic communication on the development of trust between leaders and subordinates and performance effectiveness. A general goal of the program is to develop a conceptual model of leader-team performance.

We have completed an analysis of occupations and careers that includes the design of jobs and tools for analyzing jobs. A new research effort is beginning to determine the effects of stress on performance and how to mitigate those effects. Research is continuing to seek a better understanding of those factors that contribute to faster learning and more durable retention of skills. Research has been initiated to use latent semantic analysis to assess the strategies used by an individual in a training situation and provide feedback to address diagnosed problems.

Basic Research

- *Training*
- *Leadership*
- *Soldier*
- *Societal*





OCCUPATIONAL ANALYSIS PROGRAM



Occupational Analysis Program

Occupational Analysis
Office



The Occupational Analysis Office (OAO) analyzes, synthesizes, and reports data on the job requirements of officer and enlisted occupations in both the Active and Reserve Components. Occupational analyses are generally performed when weapon systems, organizational structures, or tasks change. These analyses focus on the need for MOS design/redesign, including creation of new MOS and the consolidation of existing MOS. In addition, the task performance, skill, and knowledge requirements of MOS are examined to determine training requirements that best support the occupational structure. OAO typically analyzes 16-20 MOSs per year, and the FY2001 workload will be substantially the same. OAO projects currently underway include job requirements studies of Infantry Officers, Battle Staff NCOs, First Sergeants and Air Traffic Controllers.

To enhance the Army's Occupational Analysis capacity, OAO is pursuing the following modernization efforts:

- Expanding OA technology to the schools to include establishing a distance learning capability.
- Using the Internet for data collection.

*Modernizing
the Process*







ARMY PERSONNEL SURVEY PROGRAM



Army Personnel Survey Program

Army Personnel Survey
Office



The Army Personnel Survey Office (APSO) is the Army's Center of Excellence for attitude and opinion surveys of Active Component soldiers and their dependent family members. Top Army leaders use the survey data to "keep a finger on the pulse" of the Army. The survey findings keep Army leaders informed about the needs of Army personnel, the need for special policies and programs, and the impact and outcomes of the policies and programs implemented. For

example, top Army leaders receive a semi-annual "Human Relations Status Report" on trends in key personnel issues. Survey results also are reported to the U.S. Congress in the annual Army Posture Statement.

Attitude and opinion surveys provide unique information because survey data have the following unique combination of characteristics: quantifiable, valid, reliable, objective, comparable, relational, replicable, generalizable, inclusive, capable of indicating trends, and anonymous. In short, surveys provide the Army with a highly cost efficient means of measuring what soldiers and their dependent family members think and do. APSO conducts two Army-wide surveys on a recurring basis: the omnibus, semi-annual Sample Survey of Military Personnel (SSMP) and the biennial Survey on Officer Careers (SOC). Army agencies and activities identify specific topics to be included in these surveys, and the results are reported directly to these proponent organizations. In addition, trend data are collected for the Army by including on a regular basis questions on topics such as satisfaction with the quality of life in the Army, job satisfaction, attitudes toward commitment to Army life, and perceptions of morale.

The APSO FY2001 program includes the Spring and Fall SSMPs, detailed analysis of SOC 2000 data, and three to five personnel surveys requested and paid for by other Army organizations. In addition, APSO will continue to provide technical advice and assistance related to surveys of Army personnel, prepare special analyses and reports to respond to requests from top Army leaders, and maintain linkages with DoD, the other Services, and the survey industry.

*Basis for
Informed
Decisions*





SPECIAL PROJECTS



Recruiting Initiatives

The Army's ability to meet its recruiting mission faces increasing challenges due to competing educational and employment opportunities in a robust economy. To address these challenges, the Secretary of the Army has approved a set of Recruiting Initiatives. ARI is contributing to these initiatives in two areas: recruiter screening and recruiting business practices. New personnel management tools are needed to select 2500 soldiers each year who have the basic competencies and skills to be successful recruiters in today's competitive environment. An examination of current business practices at the individual recruiting station is needed to ensure that those recruiters who are selected are employed in the most efficient manner possible.

In FY2001, ARI will conduct the preliminary work needed to develop a recruiter selection process linked to successful job performance. The approach will be to identify available off-the-shelf measures that build upon the recruiter selection process at the Recruiting and Retention School. We will then plan and conduct a concurrent validation to link these selection tools to measures of recruiter production and performance. These findings will feed into the science and technology program, "Improved Screening Tools for Recruiters and Station Commanders," which will take a rigorous, job-analysis-based approach to the development of new and tailored personnel screens.

Best Recruiting Practices

ARI's effort to achieve a better understanding of USAREC business practices will focus on station level business practices and identification of which practices work best in which circumstances and why. The "station missioning" program assigns the recruiting production mission to the station, and station commanders are empowered to posture and employ assets at their discretion. The expected variety of business practices found at the company/station level will provide a rich source for examining the effectiveness of alternative management tactics.

Sponsor: ASA (Mc&RA)



Training Evaluation Feedback System

Occupational Analysis
Office

Objective: To develop a user-friendly standardized training evaluation feedback system that can be administered by TRADOC schools.

Headquarters, Training and Doctrine Command (TRADOC), Regulation 350-70, Training Development Management, Processes and Products directs that the Training Evaluation (TE) process include data from soldiers and their supervisors. Because of limited funding, most positions dedicated to course evaluation were eliminated in the mid-1990s. In order to reestablish a cost-effective training evaluation system, a standardized approach to data collection is required.

This project will be divided into two phases. Phase I involves conducting a forum for the purpose of collecting information on the current methods being used to collect data to support training evaluation. Interviews with proponent school personnel, HQ TRADOC representatives, and ARI representatives will be conducted to determine current training evaluation data collection practices and procedures.

Phase II will focus on designing a methodology considering the personnel qualifications and resources available at TRADOC schools based on the Phase I interviews. This methodology will include automation techniques (e.g., surveys using disks by mail, E-mail, and the Internet) to develop, gather, analyze and report information in a cost-effective way with limited resources.

*Training
Feedback
Methodology*

Sponsor: TRADOC CG



List of Acronyms

AA	Aptitude Area	DA	Department of the Army
ACES	Army Continuing Education System	DCSOPS	Deputy Chief of Staff for Operations
ACOL	Annualized Cost of Leaving	DCSPER	Deputy Chief of Staff for Personnel
ACTD	Advanced Concept Technology Demonstration	DCST	Deputy Chief of Staff for Training
ADA	Air Defense Artillery	DLD	Distance Learning Directorate
ADCST-W	Assistant Deputy Chief of Staff for Training-West	DLI	Defense Language Institute
AIM	Assessment of Individual Motivation	DMPM	Director of Military Personnel Management
APSO	Army Personnel Survey Office	DoD	Department of Defense
ARI	U.S. Army Research Institute	DOTLMS	Doctrine, Organization, Training, Leadership Development, Material, and Soldiers
ARNG	Army National Guard	EPK-I	Enlisted Personnel Management Directorate-Combat Arms Division, Infantry Branch
ASA	Assistant Secretary of the Army	EPMD-ADA	Enlisted Personnel Management Directorate-Combat Arms Division, Air Defense Artillery Branch
ASVAB	Armed Services Vocational Aptitude Battery	ET	Embedded Training
ATD	Advanced Technology Demonstration	FBCB2	Force XXI Battle Command Brigade and Below
ATRRS	Army Training Requirements and Resources System	FCS	Future Combat System
ATSC	Army Training Support Center	FDD	First Digital Division
BTAP	Buddy Team Assignment Program	FORSCOM	Forces Command
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance	HQDA	Headquarters, Department of the Army
CAL	Center for Army Leadership	IERW	Initial Entry Rotary Wing
CCTT	Close Combat Tactical Trainer	IET	Initial Entry Training
CG	Commanding General	M&RA	Manpower and Reserve Affairs
CITT	Commanders' Integrated Training Tool	MACOM	Major Command
CONUS	Continental United States	MOP	Measures of Performance
CSA	Chief of Staff, Army	MOS	Military Occupational Specialty
CTC	Combat Training Center	MOUT	Military Operations in Urban Terrain
DBBL	Dismounted Battlespace Battle Lab	MPA	Directorate of Military Personnel Management, Enlisted Accessions Division



List of Acronyms

NCO	Noncommissioned Officers	SRB	Selective Reenlistment Bonus
OAQ	Occupational Analysis Office	SSMP	Sample Survey of Military Personnel
ODCSPER	Office of the Deputy Chief of Staff for Personnel	STRICOM	U.S. Army Simulation, Training and Instrumentation Command
ODCST	Office of the Deputy Chief of Staff for Training	TDAD	Training Development and Analysis Directorate
OPMD	Officer Personnel Management Directorate	TDR/TDNS	Training Device Requirements/ Training Device Needs Statement
PERSCOM	U.S. Total Army Personnel Command	TE	Training Evaluation
PRS	Directorate of Plans, Resources, and Operations; Resources Division, Systems Integration Branch	TLS	Training, Leader Development and Soldier
RACO	Research and Advanced Concepts Office	TRADOC	Training and Doctrine Command
RC	Reserve Component	TSP	Training Support Package
RR	Recruitment and Reenlistments	TTP	Tactics, Techniques and Procedures
S&T	Science and Technology	USAICS	U.S. Army Infantry Center and School
SF	Special Forces	USAR	U.S. Army Reserve
SOC	Survey on Officer Careers	USARC	U.S. Army Reserve Command
SOFLO	Special Operations Forces Language Office	USAREUR	U.S. Army, Europe
		USMA	U.S. Military Academy
		VE	Virtual Environment



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